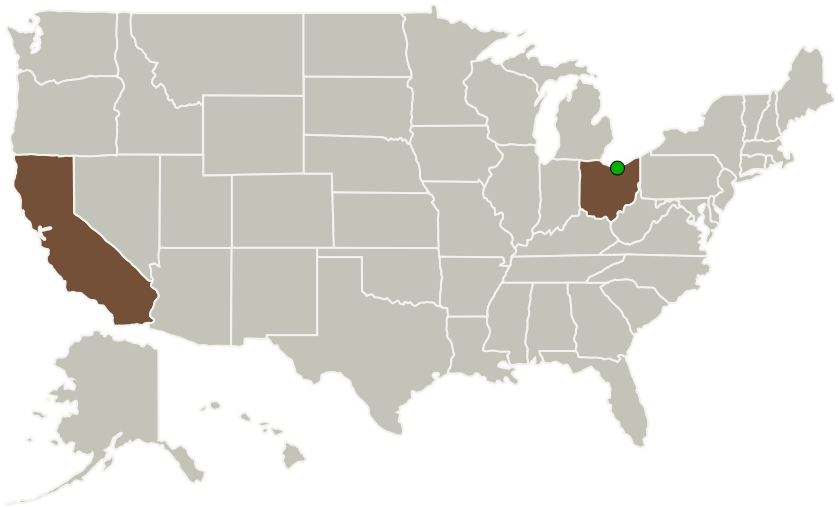
Integrated Multidisciplinary Optimization Objects, Phase II

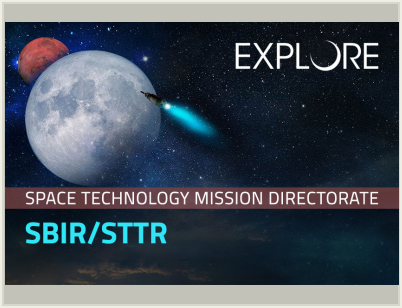
Completed Technology Project (2010 - 2012)

Project Introduction

During Phase I, M4 Engineering integrated a prototype system into OpenMDAO, a NASA GRC open-source framework. This prototype system was a proof-of-concept that M4 physics based modules could be integrated in OpenMDAO. The results generated in OpenMDAO compared well to the results generated in another framework, ModelCenter. Phase II will be a demonstration of enhanced system functionality with the integration of additional modules and design tools. The integrated objects will perform discipline-specific analysis across multiple flight regimes at varying levels of fidelity. The process will also deliver system-level, multi-objective optimization. Phase II will also showcase a refined system architecture that allows the system to be less customized to a specific configuration (i.e., system and configuration separation) as well as additional example problems. By delivering a capable and validated MDAO system along with a set of example applications to be used as a template for future users, this work will greatly expand NASA's high-fidelity, physics based MDAO capabilities and enable the design of revolutionary vehicles in a cost effective manner. This proposed work compliments M4 Engineering's expertise in developing modeling and simulation toolsets that solve relevant subsonic, supersonic, and hypersonic demonstration applications.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
M4 Engineering, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Long Beach, California
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

Project Transitions

January 2010: Project Start

January 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139123)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

M4 Engineering, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

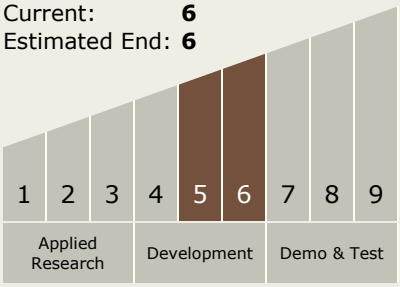
Carlos Torrez

Principal Investigator:

Katherin Y Alston

Technology Maturity (TRL)

Start: **5**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.5 Mission Architecture, Systems Analysis and Concept Development
    - TX11.5.3 Tools and Methodologies for Vehicle or Concept Definition Activities

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System